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EXAMINER

GOUDREAU, GEORGE A

ART UNIT PAPER NUMBER

1763

DATE MAILED: 03/31/2003

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09-935805

Applicant(s)

Ma et al

Examiner

George Goudreau

Group Art Unit

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— The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

☒ Responsive to communication(s) filed on 2-03-01 (re - paper # 7)

☐ This action is FINAL.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 1-75 is/are pending in the application.

Of the above claim(s) 39-75 is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-38 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

☐ All ☐ Some* ☐ None of the:

☐ Certified copies of the priority documents have been received.

☐ Certified copies of the priority documents have been received in Application No. _____.

☐ Copies of the certified copies of the priority documents have been received

in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 4

☐ Interview Summary, PTO-413

☒ Notice of Reference(s) Cited, PTO-892

☐ Notice of Informal Patent Application, PTO-152

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Other _____

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15. Applicant's election with traverse of the cmp slurry composition claims in Paper No. 7 is acknowledged. The traversal is on the ground(s) that the cmp slurry composition claims cannot be restricted from the cmp method claims for the reasons stated by the examiner since the method claims can be practice with either a cmp slurry which contain abrasive particles or with a cmp slurry which is abrasive free. Thus, the method claims may use the same cmp slurry claimed by applicant in his composition claims, at least part of the time, contrary to what the examiner purports. This is not found persuasive because the method claims may use a cmp slurry which contains abrasive particles. Thus, the method claims may be practiced with a cmp slurry other than that which is claimed by the applicant (i.e.-an abrasive free cmp slurry).

The requirement is still deemed proper and is therefore made FINAL.

The examiner will, however, vacate the election of species requirement for the elected composition claims at this time without prejudice.

16. Claims 3, 13, 21, and 30-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

-In line 4 of claims 3, and 38, the term "periodate ammonium" should be replaced with "periodate, ammonium".;

-The last line of claim 13 is redundant upon the first 2 lines of claim 13.;

-The last part of claims 21, and 32 are missing.;

-Claim 30 incorrectly depends upon claim 30 instead of claim 29 as it should.;

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-In claim 13, applicant incorrectly lists compounds in a Markush group which are not tungsten based compounds as is claimed by the applicant.; and

-In claim 30, applicant incorrectly recites zero concentration being possible for components which must be present in the cmp slurry which is claimed in the claim upon which this claim depends.

17. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

18. Claims 1, 3-5, 10-19, 21, 23-25, and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Kondo et. al. (6,117,775).

Kondo et. al. disclose an abrasive free cmp slurry which may be used to cmp polish a Cu layer on a wafer which has a PH of 3 in graph 26. The cmp slurry has the composition listed below:

- citric acid (i.e.-a complexer),
- BTA (a corrosion inhibitor),
- H2O2 (i.e.-an oxidant), and
- H2O

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This is discussed specifically in columns 14-15; and discussed in general in columns 1-24. This is shown in figures 1-26.

As to applicant's recitation in their cmp slurry composition claims that the cmp slurry is used to conduct certain cmp processes the examiner cites the case law listed below of interest to the applicant in this regard.

Furthermore, it is obvious to one skilled in the art that the configuration of the substrate worked upon by the apparatus claimed in this invention is not patentable in view of In re Young (25 U.S.P.Q. 69, 71 (CCPA 1935)) and In re Rishoi (94 U.S.P.Q. 71,73 (CCPA 1952)). The Court of Customs and Patent Appeals stated in In re Young that inclusion of material worked upon by a machine as element in claim may not lend patentability since claim is not otherwise allowable. Similarly, the Court of Customs and Patent Appeals stated in In re Rishoi that there is no patentable combination between a device and the material upon which it works.

Thus, it is irrelevant that the cmp slurry disclosed above is not specifically employed in the specific processes which are recited by the applicant in their composition claims since the cmp slurry which is taught above is inherently capable of conducting the process which is claimed by the applicant. Thus, the process limitations in applicant's composition claims are fully met in this regard. The examiner cites the case law listed below of interest to the applicant in this regard.

In re Swinehart (169 U.S.P.Q. 226 (CCPA)) and In re Best (195 U.S.P.Q. 430 (CCPA)) state that when an examiner has reasonable basis for believing that functional characteristics asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be

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inherent characteristics of the prior art, the examiner possesses the authority to require an applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied upon.

19. Claim 30 is rejected under 35 U.S.C. 102(e) as being anticipated by

Li et. al. (2002/0173221).

Li et. al. disclose an abrasive free cmp slurry which may be used to cmp polish a Cu layer on a wafer which has approximately a neutral PH (i.e.-a PH of approximately 6.9 as is claimed).

The cmp slurry has one of the compositions listed below:

1 St. embodiment:

- EDTA, glycine, or citric acid (i.e.-a complexer),
- H₂O₂, FeNO₃, or iodates (i.e.-an oxidizer),
- BTA (i.e.-a corrosion inhibitor),
- acetic acid, H₃PO₄, or KOH (i.e.-PH adjustors), and
- H₂O
- approximately neutral PH (i.e.-approximately PH=6.9)

2 ND embodiment:

- ammonium hydrogen phosphate (i.e.-a PH adjuster),
- H₂O₂ (i.e.-an oxidizer),
- BTA (i.e.-a corrosion inhibitor),
- IDA (i.e.-a corrosion inhibitor), and

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-H₂O

This is discussed specifically on pages 5-8; and is discussed in general on pages 1-9. This is shown in figures 1-6.

20. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

21. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

22. Claims 1-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wojtczak et. al. (6,409,781).

Wojtczak et. al. disclose cmp slurries which can be used to cmp polish Cu, W, TaN, TiN, or TaN which have any of the compositions listed below:

1 St. embodiment:

-HIO₃,

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-HNO₃,

-NH₄OH,

-H₂O,

-silica abrasive particles,

PH=3.1

2 ND embodiment:

-HIO₃,

-IDA,

-H₃PO₄,

-KOH,

-H₂O,

-silica abrasive particles

PH=2.9

They further teach that the IDA cleaning agent may be replaced with any of oxalic acid, glycine, or succinic acid. (Succinic acid is also a well known film forming agent which can be used as an anticorrosive agent in cmp slurries.) They also teach the equivalence of using KIO₃ as the oxidizing agent in place of HIO₃. This is discussed specifically in columns 7-10; and discussed in general in columns 1-12. This is shown in figures 1-7. Wojtczak et. al. fail, however, to specifically disclose the following aspects of applicant's claimed invention:

-the specific usage of KIO₃ as the oxidant,

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- the specific usage of succinic acid as the anticorrosive agent in the cmp slurry,
- the specific cmp processes which are claimed by the applicant for their claimed cmp slurry compositions,
- the specific usage of a cmp slurry with the specific process parameters which are claimed by the applicant, and
- the specific usage of an abrasive free cmp slurry

It would have been obvious to one skilled in the art to replace the HIO₃ oxidant in the cmp slurry taught above with a KIO₃ oxidant based upon the teaching of the equivalency in using either compound as an oxidant in the cmp slurry taught by Wojtczak et. al.

It would have been obvious to one skilled in the art to use either or both of IDA, and succinic acid as the anticorrosive agent in the cmp slurry taught above based upon the teaching of the equivalency in using either compound in the cmp slurry taught above for the same purpose by Wojtczak et. al. The examiner cites the case law listed below of interest to the applicant in this regard.

In re Crockett 126 U.S.P.Q. 186 (CCPA) states that where the prior art teaches the use of two materials for the same purpose, it would have been obvious to one of ordinary skill in the art to use the two materials in combination for the same purpose.

Thus, it would have been obvious to use both the IDA, and the succinic acid as the anticorrosive agent in the cmp slurry taught above since the reference teaches the equivalence of using either for the same purpose.

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It would have been obvious to one skilled in the art to use a fixed abrasive pad in place of the free floating abrasive particles in the cmp slurry taught above to conduct the cmp polishing process taught above. It is conventional or at least well known in the cmp polishing arts to use a fixed abrasive polishing pad in combination with an abrasive free slurry to cmp polish a substrate. (The examiner takes official notice in this regard.) Further, this would have simply involved the usage of an alternative, and at least equivalent means for providing the physical action in a cmp polishing process to the specific means which are taught above.

As to applicant's recitation in their cmp slurry composition claims that the cmp slurry is used to conduct certain cmp processes the examiner cites the case law listed above of interest to the applicant in this regard. Thus, it is irrelevant that the cmp slurry disclosed above is not specifically employed in the same process which is recited by the applicant in their composition claims since the cmp slurry which is taught above is inherently capable of conducting the process which is claimed by the applicant. Thus, the process limitations in applicant's composition claims are fully met in this regard. The examiner cites the case law listed above of interest to the applicant in this regard.

It would have been prima facie obvious to conduct the cmp process taught above under any of a variety of different process conditions including those which are specifically claimed by the applicant. These are all well known variables in the cmp polishing art which are known to effect both the rate and quality of the cmp polishing process. Further, the selection of particular

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values for these variables would not necessitate any undo experimentation which would be indicative of a showing of unexpected results.

Alternatively, it would have been obvious to one skilled in the art to employ the specific process conditions which are claimed by the applicant in the cmp polishing process taught above based upon In re Aller as cited below.

"Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F. 2d 454, 105 USPQ 233, 235 (CCPA).

Further, all of the specific process parameters which are claimed by the applicant are results effective variables whose values are known to effect both the rate, and the quality of the cmp polishing process.

23. Claims 1-6, 10-26, 29, 31-33, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et. al. as applied in paragraph 19 above.

Li et. al. as applied in paragraph 19 above fail to specifically disclose the following aspects of applicant's claimed invention:

- the specific usage of a cmp slurry with the specific process parameters which are claimed by the applicant, and
- the specific usage of IDA as the corrosion inhibitor in the cmp slurry.

It would have been obvious to one skilled in the art to replace the BTA corrosion inhibitor used in the cmp slurry taught above with IDA based upon the following. The usage of IDA as a

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corrosion inhibitor in a cmp slurry is conventional or at least well known in the cmp polishing arts. (The examiner takes official notice in this regard.) Further, this simply represents the usage of an alternative, and at least equivalent means for supplying a corrosion inhibitor in the cmp slurry taught above to the specific means which are taught above.

It would have been prima facie obvious to conduct the cmp process taught above under any of a variety of different process conditions including those which are specifically claimed by the applicant. These are all well known variables in the cmp polishing art which are known to effect both the rate and quality of the cmp polishing process. Further, the selection of particular values for these variables would not necessitate any undo experimentation which would be indicative of a showing of unexpected results.

Alternatively, it would have been obvious to one skilled in the art to employ the specific process conditions which are claimed by the applicant in the cmp polishing process taught above based upon In re Aller as cited above. Further, all of the specific process parameters which are claimed by the applicant are results effective variables whose values are known to effect both the rate, and the quality of the cmp polishing process.

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24. Claims 6-9, 22, 26-28, 30-32, 34, and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et. al. (6,117,775) as applied in paragraph 18 above.

Kondo et. al. as applied in paragraph 18 above fail to disclose the following aspects of applicant's claimed invention:

- the specific usage of a cmp slurry with the specific process parameters which are claimed by the applicant,
- the specific usage of IDA as the corrosion inhibitor in the cmp slurry, and
- the specific usage of KOH or NaOH to adjust the PH of the cmp slurry

It would have been obvious to one skilled in the art to replace the BTA corrosion inhibitor used in the cmp slurry taught above with IDA based upon the following. The usage of IDA as a corrosion inhibitor in a cmp slurry is conventional or at least well known in the cmp polishing arts. (The examiner takes official notice in this regard.) Further, this simply represents the usage of an alternative, and at least equivalent means for supplying a corrosion inhibitor in the cmp slurry to the specific means which are taught above.

It would have been obvious to one skilled in the art to employ any of the well known acids or bases (i.e. -KOH, NaOH) which are used to adjust the PH of a cmp slurry in the process taught above based upon the following. The usage of these compounds to adjust the PH of a cmp slurry is conventional or at least well known in the cmp polishing arts. (The examiner takes official notice in this regard.) Further, this simply represents the usage of an alternative, and at least

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equivalent means for adjusting the PH of the cmp slurry taught above to the specific usage of other such means.

It would have been prima facie obvious to conduct the cmp process taught above under any of a variety of different process conditions including those which are specifically claimed by the applicant. These are all well known variables in the cmp polishing art which are known to effect both the rate and quality of the cmp polishing process. Further, the selection of particular values for these variables would not necessitate any undo experimentation which would be indicative of a showing of unexpected results.

Alternatively, it would have been obvious to one skilled in the art to employ the specific process conditions which are claimed by the applicant in the cmp polishing process taught above based upon In re Aller as cited above. Further, all of the specific process parameters which are claimed by the applicant are results effective variables whose values are known to effect both the rate, and the quality of the cmp polishing process.

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner George A. Goudreau whose telephone number is (703) -308-1915. The examiner can normally be reached on Monday through Friday from 9:30 to 6:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Examiner Gregory Mills, can be reached on (703) -308-1633. The appropriate fax phone number for the organization where this application or proceeding is assigned is (703) -306-3186.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) -308-0661.


George A. Goudreau/gag

Primary Examiner

AU 1763